



## How to be a Better Seal User - Part Three

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### Types of Seals

There are at least 5,000 different commercially available seals. Most seals can be categorized as belonging to one of the following 11 categories (although there is some overlap):

**wire loop seal:** This passive seal consists of one wire twisted around one or more wires. The wire bundle is then passed through the hasp of a container or door to be secured. A metal or plastic head or housing then crimps, traps, or irreversibly captures the ends of the wire bundle. The lead-wire seal is the classic example of this type of seal. A blob of soft lead is used to crimp the ends of the wire bundle. Lead-wire seals, however, have fallen out of favor because of the poor security they offer and because of the health and environmental problems presented by lead. Other, safer soft alloys are sometimes used instead.

**metal cable seal:** A larger and sturdier version of the wire loop seal. Aircraft cable is used, with each end crimped or irreversibly clamped into a head or housing. Because of its great resistance to force, this is a barrier seal—part lock and part seal.

**plastic strap or ribbon seal:** A one-piece plastic molded strap with one end that snaps irreversibly into a head or housing on the other end, after the plastic strap is passed through the hasp of a container or door. This type of seal has the advantage that it is less likely to injure personnel or damage equipment coming in contact with sealed moving containers than is the case with metal seals.

**metal ribbon (car-box or car-ball) seal:** A seal made from sheet metal. One end of the ribbon snaps irreversibly into a head on the other end. Popular for use on railcars. Though robust, this is not a barrier seal.

**bolt seal:** This is a barrier seal consisting of a strong bolt with each end larger in diameter than the hasp. One half is designed to snap irreversibly into the other half through the hasp. These barrier seals are popular for use on trucks and transportainers. Bolt seals can usually withstand substantial force without opening.

**padlock seal:** A "self-locking" metal or plastic seal that looks like a padlock. Intended for one-time use. Despite the name, these are seals, not locks. They are often used on residential and commercial utility meters.

**adhesive label seal (adhesive tape seal or pressure-sensitive adhesive seal):** These seals are sticky labels that become damaged if removed from what they are stuck to. They are often used as tags. These types of seals are inexpensive and easy to use, but do not typically provide high levels of security, nor are they very robust.

**frangible seal:** This type of seal is often used for tamper-evident packaging, such as found on over-the-counter pharmaceuticals. The seal material, which can be a film, foil, dried paste, or plastic cap, fractures or ruptures when the container is opened.

**(passive) fiber optic seal:** The cable is an optical fiber or bundle of optical fibers. Cutting the optical fibers changes their light transmission or other properties.

**(active) fiber optic seal:** In an active fiber optic seal, light pulses are sent down the optical fibers continuously, a number of

times per second. If the optical fibers are cut, the light pulses fail to complete the loop and this is detected by the electrooptics. This type of seal is typically reusable.

(active) electronic seal: This type of (typically reusable) seal is battery powered and checks continuously for tampering.

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